REMARKS

I. Status of the Claims

Claims 29-31 and 45-46 are pending. Claims 29 and 45 are amended herein.

II. Concerning the Amendments

Claim 29 is amended to recite that it is directed to a solid multi-component membrane comprising a gas-impervious mixed metal oxide material of perovskite structure having both oxygen ion conductivity and electron conductivity properties.

Claim 45 is amended to recite that it is directed to a solid multi-component membrane comprising a gas-impervious mixed metal oxide material of perovskite structure having both oxygen ion conductivity and electron conductivity properties.

Support for the above amendments appears at page 14, lines 1-17; page 15, lines 9-15; page 18, lines 4-6; page 24, lines 11-17; and page 24, line 33 to page 25, line 2 of the Specification.

Applicants respectfully request entry of the amendments. No new matter is presented.

III. The Claimed Invention

Applicants' claimed invention is directed to a solid multi-component gas-impervious membrane comprised of mixed metal oxide compositions of perovskite structure having both oxygen ion conductivity and electron conductivity. See, Claims 29 and 45 as amended herein. Such membranes may be used to separate oxygen from an oxygen-containing gas (such as air) which may then be reacted with a reactant gas, i.e., an oxygen-consuming gas. See, Specification at page 4, line 29 to page 5, line 32. At pages 37-62 of the Specification, such uses are described in more detail. Thus, an important feature of the invention is that such membranes are oxygen-ion permeable, but are gas-impervious with respect to an oxygen-containing gas (such as air) or oxygen-consuming gas (such as methane) and thus do not allow such gases to pass through the membrane to any significant extent.

IV. Concerning the Rejections

Double Patenting:

Claim 31 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of commonly assigned U.S. Patent No. 5,744,015. Applicants respectfully submit a terminal disclaimer to obviate such rejection. Applicants therefore request withdrawal of this rejection.

Anticipation under 35 U.S.C. §102(e)

Claims 29, 30, 45 and 46 are rejected under 35 U.S.C. § 102 (e) as being anticipated by Matsumoto (U.S. Patent 4,742,038). The Office asserts that Matsumoto is directed to a monolithic catalyst support for use in the purification of exhaust gases, comprising a metal substrate, an oxide membrane formed on the surface of the substrate, and an active alumina layer formed on the oxide membrane. The Office submits that a perovskite type composite oxide membrane is formed when alkaline earth metals, alkali metals and lanthanoid (lanthanide) elements are simultaneously incorporated into the support substrate. The Office also asserts that the so-called oxide membrane meets the limitations of claims 29 and 45, and further that the addition of lanthanum into the metal support also provides an oxide membrane that meets the limitations of claims 30 and 46. Applicants submit that there are significant differences between the claimed invention and the disclosure by Matsumoto. Applicants respectfully traverse the rejection.

Matsumoto is directed to a monolithic catalyst support used to support a catalyst for purifying exhaust gases from internal combustion engines. See, column 1, lines 7-14 of the reference. Such catalysts are said to be supported on an activated porous alumina layer formed on the surface of a metal support. Column 1, lines 21-24. A problem of such catalysts is said to be an inability for the porous, activated alumina catalyst support layer to adhere to the metal support, due to the presence of an α–alumina oxide membrane said to be formed on the surface of the metal support by heat treatment of the same. Column 1, lines 30-38. Matsumoto asserts that use of a certain metal support provides a so-called "oxide membrane" that inhibits formation of α–alumina during heat treatment of the metal support, and that this results in better adherence of the porous activated alumina catalyst support layer to the metal substrate. Matsumoto asserts that the foregoing results from use of a metal substrate that includes:

"from 5 to 30% by weight of chromium (Cr), from 1 to 10% by weight of aluminum (Al), from 0.01 to 0.5% by weight of one selected from the group consisting of potassium (K), rubidium (Rb), cesium (Cs), francium (Fr), calcium (Ca), strontium (Sr), barium (Ba), radium (Ra), lanthanoid elements and a mixing thereof, and the balance of iron (Fe).

...

The feature of the invention lies in that the composition of the metal substrate for the catalyst support contains, from 0.01 to 0.5% by weight of potassium (K), rubidium (Rb), cesium (Cs), francium (Fr), calcium (Ca), strontium (Sr), barium (Ba) and radium (Ra) or lanthanoid elements alone or in combination.

...

The lanthanoid elements can include lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb) and lutetium (Lu). The effect of this invention can be increased by adding the lanthanoid elements in an amount from 0.001 to 0.10 mol and, more preferably, from 0.002 to 0.05 mol relative to 1 mol of aluminum."

See, column 1, lines 41-46 and column 2, lines 11-19, 26-31, and 50-58 of the reference (emphasis added). This so-called oxide membrane is said to be formed on the surface of the metal substrate by heating the above metal substrate to temperatures of 800 to 1200°C in an oxidative atmosphere. Column 2, lines 59-62.

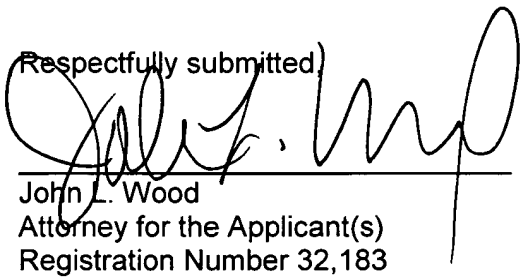
Matsumoto does not disclose or suggest a solid multi-component membrane with oxygen ion conducting and electron conducting properties. Still further, Matsumoto does not disclose or suggest a membrane which is gas-impervious. Matsumoto simply forms the so-called oxide membrane on the surface of the metal support by simple heat treatment of a metal substrate that includes such lanthanides within the metal alloy. This is essentially only a surface oxidation of the metal substrate itself. Indeed, the teachings by Matsumoto could not disclose or suggest the transport of oxygen ions through the so-called oxide membrane, since the metal substrate itself would not permit it. Further, Matsumoto's stated objective is also to produce a porous (gas permeable) oxide catalyst support. It is submitted that Matsumoto does not teach preparation of a membrane that is oxygen-ion conducting, electron conducting and gas impervious.

Applicants respectfully request withdrawal of the rejection.

V. Concluding Remarks

Applicants submit that Claims 29-31 and 45-46 are in condition for allowance and respectfully request a Notice of Allowance for the same at an early date.

Respectfully submitted,



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